About the same time Daniel Berthelot[4] published a statement concerning the changes which specimens of certain minerals, placed by Marcellin Berthelot in November, 1906, in the neighborhood of radiferous barium chloride, had undergone in a years' time. It was found that a colorless quartz from la Gardette and a white, cleavable fluorspar were unchanged; that a violet, amethystine quartz (containing manganese) from Uruguay, which had been previously decolorized by heating, was recolored; and that a violet fluorspar from Weardale (Durham) had behaved similarly.

Later Bordas[5] observed that the coloration of crystallized alumina by exposure to radium bromide is not due to the action of the α-rays, since these were absorbed by the glass envelope containing the bromide; but that the γ-rays are operative in this respect, for colorless corundum becomes distinctly yellow after forty minutes, and topaz colored after several hours' exposure to the action of the Röntgen rays, and these rays are analogous to the γ-rays of radium.

On April 5, 1909, the writer received several crystals of ruby from W. P. Dewey, of Los Angeles, Cal. Two of these specimens were placed in radium chloride of 7,000 activity; one in a tube containing radium chloride of 7,000 activity, in order that the emanation would act upon it; and several in a box containing radium of the same activity. These were then set aside in the dark, and examined recently after six months' exposure. No change in color was observed, and the specimens were entirely unaffected.

Chas. Baskerville
College of the City of New York,
November 12, 1909

Demonstrations of Electrical Oscillations

The production of high-frequency oscillations from arc or spark has become such a simple matter that the use of the experiments described by Professor Huff in Science for November 12 is strongly to be recommended, especially as demonstrations before classes in alternating currents. With extremely simple means one can exhibit to an almost extravagant degree some of the effects of alternating currents which at commercial frequencies either do not appear at all, or only with the aid of more costly apparatus.

In this connection the following notes may be of service:

1. Steadier and more rapid oscillations are attainable with the metallic arc than between carbon electrodes. The iron arc in free air gives good oscillations, especially when capacity and self-inductance are so adjusted that the note is a shrill squeak.

2. Many commercial condensers show well the phenomenon of the "musical capacity," *i. e.*, the production of a musical note synchronous with that in the arc. The arc should be placed at a considerable distance from the condenser.

3. Simon's "speaking arc" is shown with a pair of flaming arc carbons and 220-volt supply, making the arc as long as possible. Connect in parallel with the arc a capacity of from 1 to 5 m.f. and the secondary of a small transformer. The transformer primary is in series with a battery and telephone transmitter capable of carrying an ampere. After a little experimentation the arc can be made to reproduce sounds audible throughout a large room.

4. Should the arc go out accidentally, it may be found that the transformer continues to reproduce the sounds, illustrating the "speaking transformer."

5. Some effects at much higher frequencies can be shown by means of the type of discharge recently described by the author.[1] When a discharge at about one tenth of an ampere is passed between metallic terminals in illuminating gas, or better in a mixture of hydrogen and acetone vapor, oscillations of the order of a million per second are generated without the aid of capacity or self-inductance

[4] *Compt. rend.*, 145, 818.
[5] *Compt. rend.*, 145, 874.

[1] *Am. Jour. Sci.*, September, 1909, p. 239. *Phys. Zeitschr.*, September 15, 1909, p. 623.

in parallel with the arc. Besides the usual experiments, the existence of a large number of harmonics may easily be shown by means of resonance. The current in the neighborhood of the discharge is much greater than that taken from the mains, owing to the conversion of direct-current into alternating-current energy. For these experiments an e.m.f. of at least 400 volts, alternating, or better direct, is necessary.

WALTER G. CADY

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SOCIETIES AND ACADEMIES

THE AMERICAN PHILOSOPHICAL SOCIETY

Halley's Comet: C. L. DOOLITTLE.

The return of Halley's comet in 1910 has naturally been looked forward to with great interest by astronomers and others. For the purpose of encouraging investigation of the circumstances of its return, a prize of 1,000 Marks was offered by the *Astronomische Gesellschaft* in 1904. A very complete discussion of the available data was carried out by P. H. Cowell and Andrew C. D. Crommelin, of Greenwich. It has been referred to in various places under the motto, "Isti mirantur stellam." The prize was awarded to this discussion.

As soon as the region where the comet was expected to be found had emerged from the sun's rays in 1908, search was undertaken, photographically, in this country and Europe. This was continued until the sun's rays again interfered, but without result. On resuming the process during August of the present year, impressions were found on several plates, the first to achieve success being Dr. Wolf, of Heidelberg. He first detected the image on a plate taken August 28, but did not venture to announce his discovery until September 11. Two plates were taken at Greenwich on September 9. At first nothing was found on either, but a reexamination afterwards showed faint images of the comet on both. It is barely possible that a reexamination of the plates taken last winter may show faint images of the comet, but nothing has been announced up to the present time. It is now easily visible with the 18-inch telescope of the Flower Observatory. The ephemeris of Messrs. Cowell and Crommelin at the time of discovery required a correction of 25 seconds in right ascension and 4 minutes in declination, which must be considered remarkably satisfactory when we remember that the last observations at their disposal were made nearly seventy-four years ago. The time of perihelian passage, given in this discussion, seems to require the correction of 3.4 days, which makes the date April 20, 1910. Another examination of this point gives for the date April 18.63. The nearest approach to the earth will be May 19, distance about 14,000,000 miles, but it will then be so near the sun that it will probably not be visible. On May 18.14, Greenwich mean time, the earth and the comet will be in heliocentric conjunction. It is not unlikely that, on this date, the earth will pass through the tale of the comet. The date when it will be visible to the naked eye is quite uncertain, but probably it will be bright enough for this purpose some time during February, when it will be seen in the western sky after sunset. Toward the end of March, after passing the sun, it appears in the morning before sunrise, reaching its greatest apparent distance from the sun early in May. Toward the middle of May, it again passes the sun and reappears in the evening sky.

Halley's investigation of this comet forms an epoch in astronomical history, but it must be confessed that considerable courage on his part was required to make the prediction of its return in 1759. Probably if he had been aware of the uncertainty attending the identification, depending on the period alone, he would hardly have ventured to make it. Examination of ancient records indicates a succession of visits, extending back to 240 B.C., with the very considerable range of a little more than five years between the longest and shortest period. With such a range some of these supposed appearances must be regarded as resting on rather slight foundation. A committee appointed by the Astronomical Society has formulated a plan for keeping the comet constantly in view, by interesting a series of observers, so placed in latitude and longitude that the comet shall never be lost sight of. A series of photographs, taken in this way, giving a continuous history of the comet, should go far toward solving a number of problems connected with the physical behavior of these bodies.

THE BIOLOGICAL SOCIETY OF WASHINGTON

THE 461st meeting was held November 13, 1909, with President Palmer in the chair. The following communications were presented:

The History of the Mule-footed Hog: W. J. SPILLMAN.